

WHAT IS CLAIMED IS:

1. An ink-jet recording apparatus for forming an image on a recording medium by using a plurality of ink discharge means which discharge inks;

5 said plural ink discharge means corresponding to a plurality of inks with different dye densities in inks, and each of said plural inks having a different penetrability.

10 2. The ink-jet recording apparatus according to claim 1, wherein said plural inks have different component ratios of a surface active component in said inks.

15 3. The ink-jet recording apparatus according to claim 2, wherein, among said plural inks, an ink having a relatively high dye density in ink has a lower component ratio of said surface active component than an ink having a relatively low dye density.

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25 4. The ink-jet recording apparatus according to claim 1, wherein said plural inks consists of the first ink with a relatively high dye density in ink and the second ink with a relatively low dye density in ink in comparison with the first ink, said first ink containing no ^{surfactant} ~~surface active component~~ in a composition thereof, while said second ink containing said ~~surface~~ ^{surfactant}.

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~~active component in a composition thereof.~~

5 3 The ink-jet recording apparatus according to
claim 1, comprising an image processing means which
controls the number of recording dots per unit area of
said recording medium in accordance with an inputted
image signal to perform gradation recording.

10 4 6. The ink-jet recording apparatus according to
claim 5, further comprising a distribution means for
distributing into recording data for said plural inks
with different dye densities in inks in accordance with
a gradation indicated by an inputted image signal.

15 5 7. The ink-jet recording apparatus according to
claim 1, wherein said ink discharge means is means,
which discharges an ink by utilizing heat energy and
which is provided with an electrothermal energy
converting means for generating heat energy to be given
20 to an ink.

25 6 8. The ink-jet recording apparatus according to
claim 7, wherein said ink discharge means causes an ink
to develop a state change by the heat energy applied by
said electrothermal energy converting means, thereby
discharging the ink through a discharge port according
to said state change.

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9. The ink-jet recording apparatus according to claim 1, further comprising an image reading means for reading an original image.

5 10. The ink-jet recording apparatus according to claim 1, further comprising an image transmitting and/or receiving means.

10 11. The ink-jet recording apparatus according to claim 10, further comprising an image reading means for reading an original image.

15 12. The ink-jet recording apparatus according to claim 1, further comprising an input means for entering a recording signal.

13. The ink-jet recording apparatus according to claim 12, wherein said input means is a keyboard.

20 14. An ink-jet recording method for forming an image on a recording medium by using a plurality of ink discharge means which discharge inks;

25 said plural ink discharge means corresponding to a plurality of inks with different dye densities in inks, and each of said plural inks having a different penetrability.

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15. The ink-jet recording method according to claim 14, wherein said plural inks have different component ratios of a surface active component in said inks.

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16. The ink-jet recording method according to claim 15, wherein, among said plural inks, an ink having a relatively high dye density in ink has a lower component ratio of said surface active component than an ink having relatively low dye density.

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17. The ink-jet recording method according to claim 14, wherein said plural inks consists of the first ink with a relatively high dye density in ink and the second ink with a relatively low dye density in ink in comparison with the first ink, said first ink containing no ^{surfactant} ~~surface active component~~ in a composition thereof, while said second ink containing said ~~surface active component~~ ^{surfactant} in a composition thereof.

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~~18.~~ ¹² The ink-jet recording method according to claim 14, comprising an image processing step wherein the number of recording dots per unit area of said recording medium is controlled in accordance with an inputted image signal to perform gradation recording.

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~~19.~~ The ink-jet recording method according to

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claim 18, further comprising a distribution step
distributing into recording data for said plural inks
with different dye densities in inks in accordance with
a gradation indicated by an inputted image signal.

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20. The ink-jet recording method according to
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claim 14, wherein said ink discharge means is a means,
which discharges an ink by utilizing heat energy and
which causes the ink to develop a state change by heat
10 energy and to be discharged through a discharge port
according to said state change.

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21. An ink-jet recording apparatus, comprising a
recording head equipped with a plurality of ink
15 discharge means, which discharge ink, and forming an
image on a recording medium by discharging the ink
through a plurality of discharge ports of said
recording head, wherein the plural discharge ports of
said recording head are comprised of a plurality of
20 discharge port trains corresponding to a plurality of
inks, each of the inks having a different dye density
in ink, and each of said plural inks with different dye
densities in ink has different penetrability on a
recording medium.

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22. The ink-jet recording apparatus according to
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claim 21, comprising a plurality of said recording

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heads, each of said plural recording heads discharging ink of a different color.

23. The ink-jet recording apparatus according to
5 claim 21, wherein said plural inks with different dye
densities in ink have different component ratios of
surface active component in ink.

24. The ink-jet recording apparatus according to
10 claim 23, wherein, among said plural inks, an ink
having a relatively high dye density in ink has a lower
component ratio of said surface active component than
an ink having a relatively low dye density.

25. The ink-jet recording apparatus according to
15 claim 21, wherein said plural inks with different dye
densities in ink consists of the first ink with a
relatively high dye density in ink and the second ink
with a relatively low dye density in ink in comparison
20 with the first ink, said first ink containing no
^{surfactant}
~~surface active component~~ in a composition thereof,
while said second ink containing said ^{surfactant}
~~surface active~~
~~component~~ in a composition thereof.

26. ²⁰
25 ¹⁷ claim 21, comprising an image processing means which
controls the number of recording dots per unit area of

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said recording medium in accordance with an inputted image signal to perform gradation recording.

27. The ink-jet recording apparatus according to
5 claim 26, further comprising a distribution means which
divide entered data as recording data for said plural
inks with different dye densities in inks in accordance
with a gradation indicated by an inputted image signal.

10 ²²
¹⁷ 28. The ink-jet recording apparatus according to
claim 21, wherein said ink discharge means is a means,
which discharges an ink by utilizing heat energy and
which is provided with an electrothermal energy
converting means for generating heat energy to be given
15 to an ink.

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29. The ink-jet recording apparatus according to
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claim 28, wherein said ink discharge means causes an
ink to develop a state change by the heat energy
20 applied by said electrothermal energy converting means,
thereby discharging the ink through a discharge port
according to said state change.

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30. An ink-jet recording apparatus, comprising a
25 plurality of recording heads equipped with a plurality
of ink discharge means, which discharge ink through
discharge ports, and forming an image on a recording

medium by discharging the ink through a plurality of discharge ports of said recording heads, wherein said plural recording heads correspond to a plurality of inks with different dye densities in ink, and each of said plural inks with different dye densities in ink has different penetrability on a recording medium.

31. The ink-jet recording apparatus according to claim 30, wherein said plural inks with different dye densities in ink have different component ratios of surface active component in ink.

32. The ink-jet recording apparatus according to claim 31, wherein, among said plural inks, an ink having a relatively high dye density in ink has a lower component ratio of said surface active component than an ink having a relatively low dye density.

33. The ink-jet recording apparatus according to claim 30, wherein said plural inks with different dye densities in ink consists of the first ink with a relatively high dye density in ink and the second ink with a relatively low dye density in ink in comparison with the first ink, said first ink containing no ^{surfactant} ~~surface active component~~ in a composition thereof, while said second ink containing said ^{surfactant} ~~surface active component~~ in a composition thereof.

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34. The ink-jet recording apparatus according to
claim 30²⁴, wherein said ink discharge means is a means,
which discharges an ink by utilizing heat energy and
which is provided with an electrothermal energy
5 converting means for generating heat energy to be given
to an ink.

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35. The ink-jet recording apparatus according to
claim 34²⁰, wherein said ink discharge means causes an
10 ink to develop a state change by the heat energy
applied by said electrothermal energy converting means,
thereby discharging the ink through a discharge port
according to said state change.

15 36. A recorded article formed by discharged inks
adhering to a recording medium, comprising a plurality
of inks which belong to the same color group but have
different dye densities in ink and different
penetrabilities on the recording medium.

20 37. An ink-jet recording apparatus which forms an
image on a recording medium by using a plurality of ink
discharge means discharging inks, wherein said plural
ink discharge means correspond to a plurality of inks
having different dye densities in ink, and said plural
25 inks having different dye densities in ink are divided
and held in the same ink container.

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~~38.~~ The ink-jet recording apparatus according to claim 37, wherein said plural inks having different dye densities in ink contain dyes of the same color group.

5 39. The ink-jet recording apparatus according to claim 37, wherein said plural inks having different dye densities in ink are held in said ink container, the volume of each of said inks being different.

10 ³⁰
~~40.~~ The ink-jet recording apparatus according to claim ³⁰~~37~~, wherein said plural inks having different dye densities in ink have different penetrabilities on a recording medium.

15 ³¹
~~41.~~ The ink-jet recording apparatus according to claim ³⁰~~40~~, wherein said plural inks with different dye densities in ink have different component ratios of ^{sub. K2} ~~surface active component~~ in ink.

20 ³²
~~42.~~ The ink-jet recording apparatus according to claim ³¹~~41~~, wherein, among said plural inks, an ink having a relatively high dye density in ink has a lower component ratio of said ^{surfactant} ~~surface active component~~ than an ink having a relatively low dye density.

25 43. The ink-jet recording apparatus according to claim 41, wherein said plural inks with different dye

densities in ink consists of the first ink with a relatively high dye density in ink and the second ink with a relatively low dye density in ink in comparison with the first ink, said first ink containing no surface active component in a composition thereof, while said second ink containing said surface active component in a composition thereof.

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44. The ink-jet recording apparatus according to claim ~~41~~³¹, comprising an image processing means which controls the number of recording dots per unit area of said recording medium in accordance with an inputted image signal to perform gradation recording.

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45. The ink-jet recording apparatus according to claim ~~44~~³⁷, further comprising a distribution means which divide entered data as recording data for said plural inks with different dye densities in inks in accordance with a gradation indicated by an inputted image signal.

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46. The ink-jet recording apparatus according to claim ~~41~~³¹, wherein said ink discharge means is a means, which discharges an ink by utilizing heat energy and which is provided with an electrothermal energy converting means for generating heat energy to be given to an ink.

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47. The ink-jet recording apparatus according to
claim ³⁶46, wherein said ink discharge means causes an
ink to develop a state change by the heat energy
applied by said electrothermal energy converting means,
5 thereby discharging the ink through a discharge port
according to said state change.

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48. The ink-jet recording apparatus according to
³¹claim 41, further comprising an image reading means for
10 reading an original image.

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49. The ink-jet recording apparatus according to
³¹claim 41, further comprising an image transmitting
and/or receiving means.
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50. The ink-jet recording apparatus according to
³⁹claim 49, further comprising an image reading means for
reading an original image.

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51. The ink-jet recording apparatus according to
³¹claim 41, further comprising an input means for
20 entering a recording signal.

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52. The ink-jet recording apparatus according to
⁴¹claim 51, wherein said input means is a keyboard.
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53. An ink-jet recording apparatus, comprising a

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plurality of recording heads equipped with a plurality of ink discharge means, which discharge ink through discharge ports, and forming an image on a recording medium by discharging the ink through a plurality of discharge ports of said recording heads, wherein said plural recording heads correspond to a plurality of inks with different dye densities in ink, and said plural inks of different dye densities in ink are divided and held in the same ink container.

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54. The ink-jet recording apparatus according to claim 53, wherein said plural inks having different dye densities in ink contain dyes of the same color group.

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55. The ink-jet recording apparatus according to claim 53, wherein said plural inks having different dye densities in ink are held in said ink container, the volume of each of said inks being different.

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56. The ink-jet recording apparatus according to claim ⁴³53, wherein the plural discharge ports of said recording heads comprise a plurality of discharge port trains corresponding to a plurality of different color materials, and each of said plural recording heads is capable of discharging a plurality of the same color material.

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57. The ink-jet recording apparatus according to
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claim 53, comprising an image processing means which
controls the number of recording dots per unit area of
said recording medium in accordance with an inputted
5 image signal to perform gradation recording.

58. The ink-jet recording apparatus according to
claim 57, further comprising a distribution means which
divide entered data as recording data for said plural
10 inks with different dye densities in inks in accordance
with a gradation indicated by an inputted image signal.

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59. The ink-jet recording apparatus according to
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claim 53, wherein said ink discharge means is a means,
15 which discharges an ink by utilizing heat energy and
which is provided with an electrothermal energy
converting means for generating heat energy to be given
to an ink.

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60. The ink-jet recording apparatus according to
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claim 59, wherein said ink discharge means causes an
ink to develop a state change by the heat energy
applied by said electrothermal energy converting means,
thereby discharging the ink through a discharge port
25 according to said state change.

61. An ink-jet recording apparatus comprising a

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plurality of recording heads equipped with a plurality of ink discharge means discharging inks and forming an image on a recording medium by discharging the inks from a plurality of discharge ports of said recording heads, wherein said plural recording heads correspond to a plurality of inks having different color materials, the plural discharge ports of said recording heads are comprised of a plurality of discharge port trains corresponding to the plural inks having
10 different dye densities in ink, and said plural inks having different dye densities in ink are divided and held in the same ink container.

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62.⁵¹ The ink-jet recording apparatus according to
15 claim 61⁵⁰, wherein said plural inks having different dye densities in ink have different penetrabilities on a recording medium.

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